Annual Project Summary

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Digital Database for the Concord and Green Valley faults

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Investigations Undertaken

The Northern California Quaternary Fault Map database project is an attempt to integrate geologic, geomorphic, creep, trench investigations, and other data regarding Quaternary and younger faults into a single, consistent Geographic Information System and database. This integrated data will allow researchers and others to more easily determine which aspects of fault locations and activity levels are well determined by data and which have large uncertainties or are largely speculative. We prepared a digital fault map and associated database for Quaternary and younger traces of the Concord and Green Valley faults. The data compiled in this database are consistent with the nomenclature used in the National Quaternary Fault and Fold Database of the United States (Haller, et al, 1993).

Results

Based on the reduction in the NEHRP grant for this project, we worked within the modified goals as described in an e-mail to compilers sent by R. Graymer on November 11, 2004. In order of priority, goals were to compile data for:

A. Fault traces in GIS, identifying names/numbers.
B. Fault strand rank.
C. Location certainty (text or numeric)
D. Geomorphic expression/creep expression data
E. Site specific point data OR offset unit data
F. The one not done in E
G. All the rest

Goals A and B were essential to the short term success of the Northern California Quaternary Fault Map database project and goals C and D were desirable components for compilation. We completed goals A-D and, as funding allowed, partly completed the site specific point data delineated in E.

We prepared a detailed digital map and database incorporating geologic, geomorphic, creep, trench investigations and other data related to the Concord and Green Valley

faults (Figures 1 and 2). Mapping of individual fault traces was digitized and attributed using the standardized data fields for the Northern California Quaternary Fault Map database project (Tables 1-4, R. Graymer, written communication, 11/11/2004). Quaternary and younger traces of the Concord and Green Valley faults were digitized using the mapping of Bezore, et al (2002), Bryant (1982, 1992), Dames and Moore (1972), Dooley (1973), Earth System Associates (1977), Frizzell and Brown (1976), Graymer, et al (1999), Poland (1935), Rogers Pacific (1988), Rowley and Mc Rae (1985), Sharp (1973), Sims, et al (1973), and Wills and Hart (1992) (Table 1). In addition, we digitized traces of the Atlas Peak-Foss Valley lineament zone mapped by Baldwin, et al (1998) just north of the Green Valley fault (Figure 1). Based on our evaluation of the mapped traces and the traces encompassed by Earthquake Fault Zones under the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Hart and Bryant, 1997), we determined the primary and secondary Holocene active traces for the Green Valley and Concord faults, as well as identifying traces showing evidence of Historic fault creep. The strands.evirel table (Table 2), which associates geomorphic and creep evidence with specific fault strands, also was completed.

The sites.datarel and sites.pat tables (Tables 3 and 4) were compiled as much as possible with the reduced amount of funding available for this contract. The locations and source of 2 paleoseismic sites (slip rate data), 42 trench sites documenting location and fault recency, and 6 fault creep site locations are associated with specific traces along the Concord and Green Valley faults.

Data documenting Holocene and Historic activity along the Concord and Green Valley faults will allow geologists to evaluate the evidence for activity on the strands of the these faults and locate those areas where further study could help answer questions regarding the rate of activity on the fault or connections to the surrounding faults.

Non-technical Summary

We completed a digital map of Quaternary traces of the Concord and Green Valley faults, located in the eastern San Francisco Bay region. These fault will be used in conjunction with other digital faults to assemble a map of Quaternary faults in the San Francisco Bay region. Because these digital faults reside in a Geographic Information System database, geoscientists and other interested researchers can more efficiently locate and assess evidence for activity and locate those areas where further study could help answer questions regarding the rate of activity and past earthquake history on the Concord and Green Valley faults.

Reports Published
None

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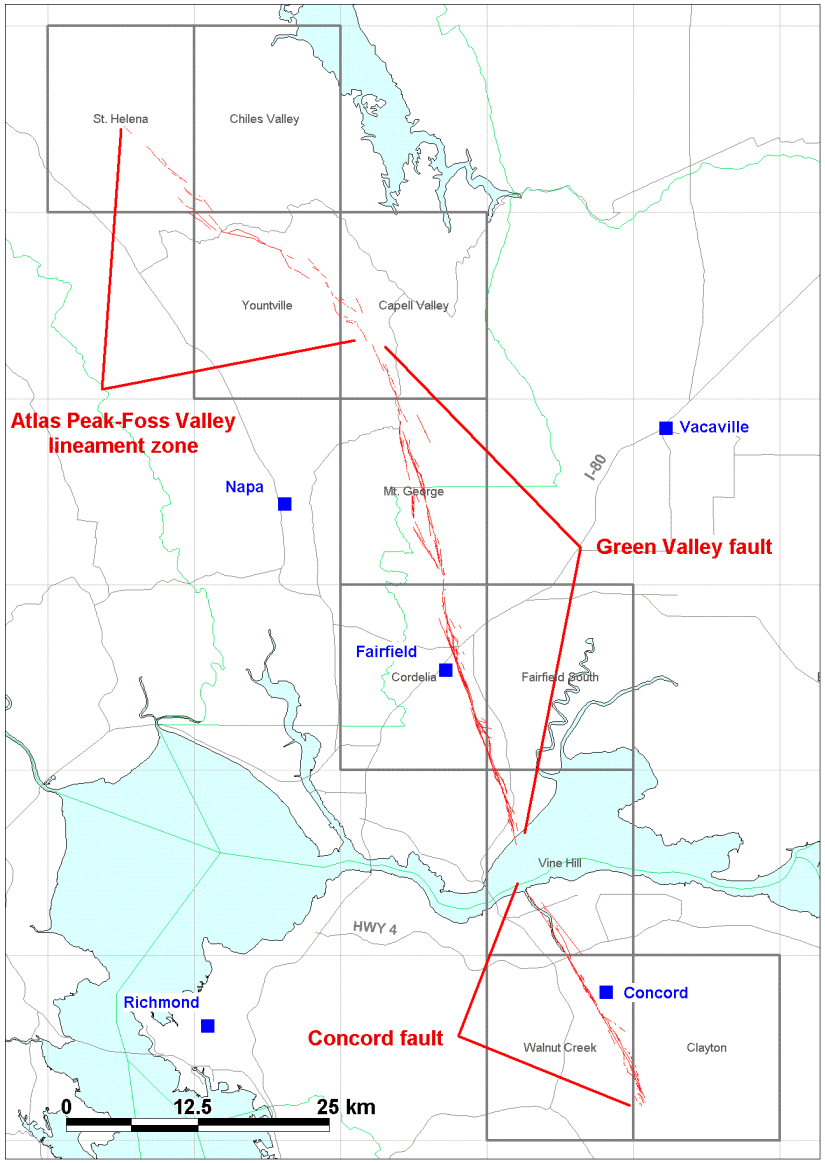

Figure 1. Digitized traces of Concord and Green Valley faults, including Atlas Peak-Foss Valley lineament zone, located in eastern San Francisco Bay region.

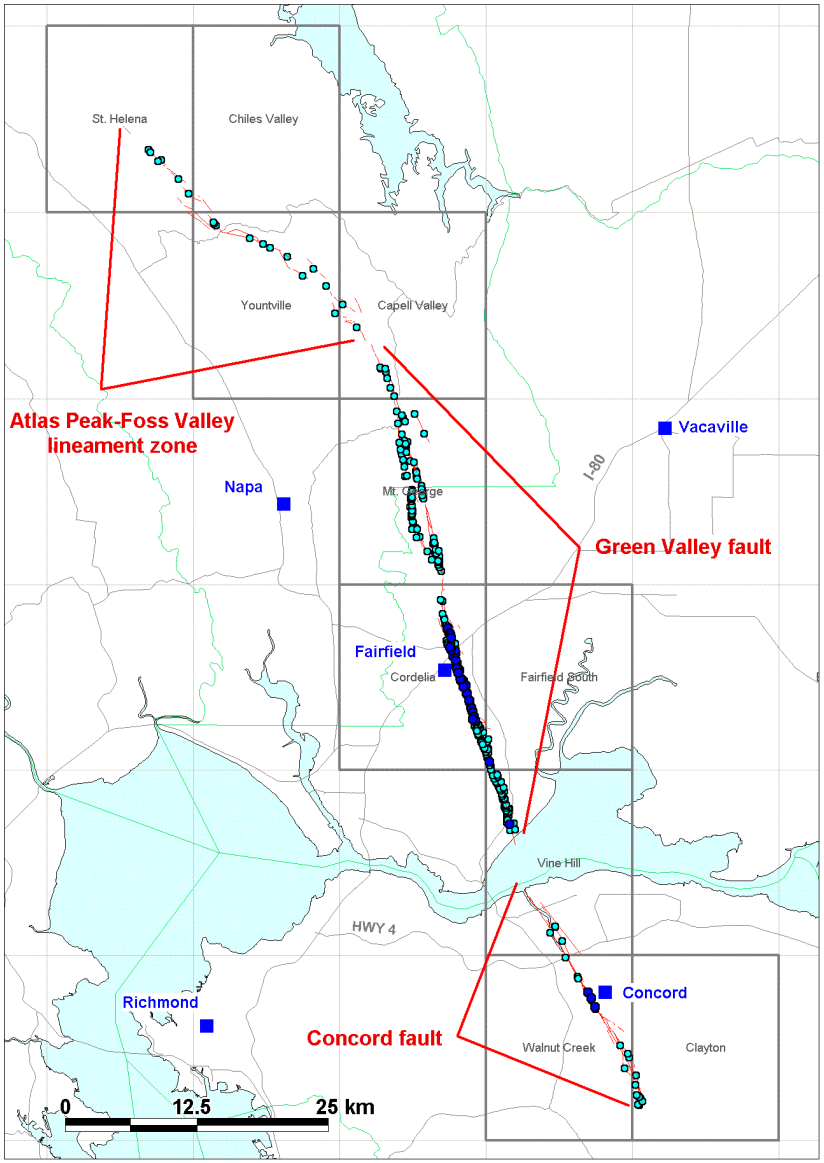

Figure 2. Digitized traces of Concord and Green Valley faults, showing locations of geomorphic features (light blue circles) and trench sites and fault creep localities (dark blue circles).

Table 1 - Strands.att attribute table

ITEM NAME	WIDTH	TYPE	Field Comments
STRAND#	6	I	Unique strand id number
FNAME	50	C	Natl Q. Fault DB fault name
FNAME_COMM	320	C	Comment on fault name
FSEC_NAME	50	C	Natl Q. Fault DB section name
FSEC_COMM	320	C	Comment on section name
QFAULTID	8	C	Natl Q. Fault DB fault/section id
LOC_CER_TXT	50	C	Text description of location certainty
LOC_CER_NUM	6	I	Numerical estimate of loc cert (m)
LOC_CER_COMM	320	C	Comment on loc cert
OFFSET	100	C	Text description of offset type
OFFSET_COMM	320	C	Comment on offset type
FRANK	50	C	Fault strand rank
FRANK_COMM	320	C	Comment on fault strand rank
DIP	2	I	Dip (degrees, 0-90)
DIPDIR	1	C	Dip direction, N,S,E,W
DIP_COMM	320	C	Comment on dip
DATE_UPDATED	8	D	Date of last data entry (yyyymmdd)

Table 2 – Strands.envirel attribute table

ITEM NAME	WIDTH	TYPE	Field Comments
STRAND#	6	I	Unique strand id#, same as in AAT
FTR_MAPPED	320	C	Geomorphic/creep expression
FTR_MAPPED_BY	100	C	Reference to previous work
FTR_MAPPED_HOW	100	C	Type of mapping used
G_WAT_EFFECT	100	C	Ground water effect
G_WAT_COMM	320	C	Comments on grd. water effect

Table 3 – Sites.datrel attribute table

ITEM NAME	WDTH	TYP	Field Commehts
SITE#	6	I	Site id number, same as in PAT
DATA_TBL#	6	I	Unique id #
DATA_TYPE	50	C	Creep rate, long term rate, event sequence, AP, etc.
DATA_COMM	320	C	Comments on data
DATA_REF	100	C	Published data reference
AGE_TXT	50	C	Text age of event/offset unit
AGE_MEAN	12	I	Numeric mean age
AGE_MAX	12	I	Numeric max age
AGE_MIN	12	I	Numeric min age
AGE_PDF	320	C	PDF of age
AGE_COMM	320	C	Comments on age
DISPL_TXT	100	C	Text amount of measured offset
DISPL_MEAN	12	I	Numeric mean offset
DISPL_MAX	12	I	Numeric max offset
DISPL_MIN	12	I	Numeric min offset
DISPL_PDF	320	C	PDF of offset
DISPL_DIR	100	C	Direction of offset
DISPL_TYPE	50	C	One-event, shared, long-term
DISPL_COMM	320	C	Comments on displacement
DISPL_SHARE_EV	70	C	List of data_tbl# for events shared in displacement
EV_EXIST	4	F	Probability (0-1) that recorded event is actual
CREEP_DAT_LIST	320	C	List of offset/date pairs for creep measurements
CREEP_TXT	50	C	Text creep rate
CREEP_MEAN	12	I	Numeric mean creep rate
CREEP_MAX	12	I	Numeric max
CREEP_MIN	12	I	Numeric min
CREEP_PDF	320	C	PDF for creep rate
CREEP_COMM	320	C	Comments on creep
DATA_EVAL_BY	100	C	Name of scientist providing evaluation
DATA_UP_BY	100	C	Name of data contributor
DATE_UPDATED	8	D	Date of last data entry (yyyymmdd)

Table 4 – Sites.pat attribute table

ITEM NAME	WDTH	TYP	Field Comments
SITE#	6	I	Unique site id number
SITE_NAME	50	C	
QFAULTID	8	C	Natl Q. Fault DB fault/section id
STRAND#	6	I	Strand id number from Strand DB
SITE_ALT_LOC	50	C	Alternate location info (GPS, etc.)
SITE_TYPE	50	C	Trench, multi-trench, geomorphic, etc
SITE_COMM	320	C	Comment on site
DATA_TBL_LIST	140	C	List of related entries in sites.datrel
EV_SEQ_LIST	35	C	List of related entries in sites.seqrel
EV_SEQ_WEIGHT	70	C	Relative weight of alternate event sequences
EV_SEQ_COMM	320	C	Comments on event sequences
EV_SEQ_EVAL_BY	100	C	Event sequences evaluated by
UPDATE_BY	100	C	Name of data contributor
DATE_UPDATED	8	D	Date of last data entry (yyyymmdd)